960,625

PATENT SPECIFICATION

DRAWINGS ATTACHED

960,625

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International Classification:—F 06 c

COMPLETE SPECIFICATION

Improvements relating to Split Roller Bearings

We, COOPER ROLLER BEARINGS COMPANY LIMITED, a British Company, of King's Lynn, Norfolk, England, do hereby declare the invention for which we pray that a patent may be granted to us, and the mthod by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to split roller bearings having an inner race which is split to form two semi-circular parts to facilitate assembly on a shaft, an outer race which is similarly split; and a cage located between these races and holding the rollers in spaced relationship circumferentially of the races.

It is usual to provide a shaft at opposite ends thereof with two types of such bearings viz. locating type and non-locating type, the former holding the shaft against axial movement while the latter permits a certain axial float to accommodate expansion and contraction of the shaft due for example to variation of temperature or shaft deflection. It is known to provide the locating type of bearing with clamping rings for clamping the split inner race on the shaft but various difficulties are experienced with known designs. First, the locating type of bearing is longer axially than the non-locating type of bearing so that housings of different sizes are required, whereas it would be advantageous to be able to make housings all of the same size for either kind of bearing. Moreover, difficulty is experienced in locating the races and bearings axially in relation to each other without axial displacement causing friction between moving parts. Still further difficulties arise in production in relation to ease of machining, grinding and hardening.

The object of the invention is to provide improved bearings of the locating kind.

According to the invention the bearing comprises a grooved inner race split into two semi-circular parts, an outer race split into two semi-circular parts, rollers between the races, a cage for locating the rollers in spaced relationship circumferentially of the races, and annular clamping means similarly split and located on each side of the inner race, the axial length of the inner race being the same as or smaller than the axial length between the outer faces of the clamping means, said clamping means being located positively axially on the inner race, means for holding the parts of the clamping means and inner race together and preventing relative axial displacement of these parts, first inwardly-directed abutment surfaces integrally formed on said clamping means which may be flame-hardened to resist wear, serving for axial location against the rollers, and second inwardly-directed abutment surfaces integrally formed on the outer-race parts for axial location against the rollers. The axial location may be accomplished by providing annular grooves in the outer surface of the inner race spaced from the ends of the race and engaged by annular ribs or projections on the clamping means. alternatively the split clamping means may be integral with the inner race parts.

Constructional forms of the invention will now be described by way of example with reference to the accompanying drawings, wherein:—

Figure 1 is a side view, partly in section of one construction of a bearing made in accordance with the invention;

Figure 2 is a side view, partly in section, of a second construction of a bearing made in accordance with the invention;

Figure 3 is a sectional end elevation, taken on line A—A on Figure 2;

Figure 4 is a side view, partly in section, of a third construction of the bearing made in accordance with the invention.

Figure 5 is a side view, partly in section, of a fourth construction of the bearing made in accordance with the invention.

Figure 6 is a side view, partly in section, of a fifth construtions of the bearing made in accordance with the invention;

Figure 7 is a side view, partly in section, of a sixth construction of the bearing made in accordance with the invention;

Figure 8 is a side view, partly in section, of a seventh construction of the bearing made in accordance with the invention;

Figure 9 is a sectional end elevation taken on line B—B on Figure 7;

Figure 10 is a side view partly in section of another construction of the bearing in accordance with the invention;

Figure 11 is a front sectional end elevation taken on centre line C—C on Figure 10.

In the Figures 10, 11 are split semi-circular inner-race parts; 12, 13 are split semi-circular outer-race parts. In Figures 1 to 6, 14, 15 are split clamping means in the form of split-ring parts, made separate from the inner race. Rollers 20 are located between the inner and outer races and are held in spaced relationship circumferentially of the races by a cage 21. The lines of split 31 of the inner race are at an angle to the axis of the bearing and flat-sided grooves 16, 17 are machined and ground in the exterior surface of this race. These grooves are spaced from the ends of the race and receive correspondingly-shaped annular ribs or projections 18, 19 on the clamping rings. The clamping rings are made of a flame-hardening steel. The projections rigidly position the clamping rings for the axial loading and positioning set up through the rollers 20. The inner race has an unchanging outer diameter except for the grooves so that it can easily be machined and ground. The clamping rings are formed with integral annular lips or flanges 6, 7, the inner surfaces 8, 9 of which form a pair of annular abutment surfaces locating axially against the rollers. These surfaces are flame-hardened.

In Figure 1 the grooves and projections are tapered in cross-section. In Figure 2 the grooves and projections have sides parallel to each other and to the ends of the races. Screws 23, 24 and 25, 26 disposed on chords of the outer circular races serve to clamp the clamping-ring parts together and in Figures 1 and 2 these screws are in the planes of the projections 18, 19. Each of the screws has a loose fit in one part of the clamping means and is threaded into the other part. In Figure 4, the projections and grooves are offset inwardly from the planes of the screws so that the inner surfaces of the projections 18, 19 are contiguous with the abutment surfaces 8, 9.

In Figure 5, the clamping rings have tapered bores. The inner race has a taper ground on each end, i.e. the groove is of varying diameter with its deepest part innermost and the clamping ring, when tightened up on the taper will pull down and mate with the vertical face of the inner race. The thrust face of the clamping ring then forms a true ring against which the roller can run and the thrust taken through the roller is transmitted to this face.

In Figure 6 the grooves are formed as flat-sided "still" threads and are ground on each end of the inner face. The ribs or projections on the clamping rings are in the form of threads corresponding to the threads on the inner race and these mate together when tightened up. Here again the thrust set up through the roller is transmitted to the vertical faces 8, 9 of the clamping ring.

In Figures 7 to 11 the split inner-race parts are integral with the clamping ring.

In Figures 7 and 9 the two parts are held together by bolts and dowels. The bolts 23, 24, 25, 26, each passes with clearance through a bore in one part, and is threaded into a tapped bore in the other part. The dowels 30 fit tightly in bores in both parts.

In Figure 8 movement between the two halves of the inner race is eliminated by means of a tenon joint. At each engaging position one end is provided with a groove 32 and the other half with a tongue 33.

In Figures 10 and 11 movement between the two halves of the inner race is eliminated by means of half-moon or "woodruff" keys 34. These keys may be positioned at any part of each joint.

The split outer race part 13 is provided with a V-shaped indent 35 at one end and a correspondingly shaped projection (not shown) at its other end. The outer-race part 12 is similarly provided with an indent and a projection and the two parts are arranged so that the projection of each part mates with the indent of the other part. The outer race 12, 13, has inwardly-facing annular abutment surfaces 40, 41.

The bearing is contained in a housing 42 shown only in Figure 1 and because of the construction of the bearing this housing can now be exactly the same for a non-locating bearing of similar loading.

WHAT WE CLAIM IS:—

1. A roller bearing comprising a grooved inner race split into two semi-circular parts, an outer race split into two semi-circular parts, rollers between the races, a cage for locating the rollers in spaced relationship circumferentially of the races, and annular clamping means similarly split and located on each side of the inner race, the axial length of the inner race being the same as or smaller than the axial length between the outer faces of the clamping means, said clamping means being located positively axially on the inner race, means for holding the parts of the clamping means and inner race together and preventing relative axial displacement of these parts, first inwardly-directed abutment surfaces integrally formed on said clamping means serving for axial location against the rollers and second inwardly-directed abutment surfaces integrally formed on the outer-race parts for axial location againt the rollers.

2. A roller bearing as claimed in claim 1

wherein the clamping means are split clamping rings formed separately from the inner race and held together by screws, said clamping rings having inwardly projecting annular flanges provided with said first abutment surfaces and flame-hardened to resist wear, said flanges being surrounded by the cage, and said clamping rings having radially inwardly-directed parts engaged in flat sided grooves in the outer surface of the inner race.

3. A roller bearing as claimed in claim 2 wherein the outer surface of the inner race is all of the same diameter except for said grooves therein.

4. A roller bearing as claimed in claim 2 wherein the ribs are tapered.

5. A roller bearing as claimed in claim 2 wherein the inner surfaces of the ribs are contiguous with the first abutment surfaces.

6. A roller bearing as claimed in claim 2, 3 or 4 wherein the grooves are of varying depth from the deepest parts adjacent the flanges.

7. A roller bearing as claimed in any one of claims 1 to 6 wherein the inner race has "still" threads on each end and the clamping rings have corresponding ribs in tthe form of threads in their bores.

8. A roller bearing as claimed in claim 1 wherein the split inner-race parts and clamping-means parts are integral with each other respectively.

9. A roller bearing as claimed in claim 8, wherein movement between the parts is prevented by means of dowels and bolts each of which latter fits with clearance in one part and is threaded into the other part of the ring.

10. A roller bearing as claimed in claim 1 wherein movement between the parts of the clamping means is prevented by screws each of which has a loose fit in one part and is threaded into the other part.

11. A roller bearing as claimed in claim 8 wherein movement between the parts is prevented by means of tenon joints comprising grooves and tongues on the meeting ends of the parts.

12. A roller bearing as claimed in claim 9, wherein movement between the parts is prevented by means of half-moon or "woodruff" keys.

13. A roller bearing as claimed in claim 1 substantially as described with reference to any of the examples illustrated in the accompanying drawings.

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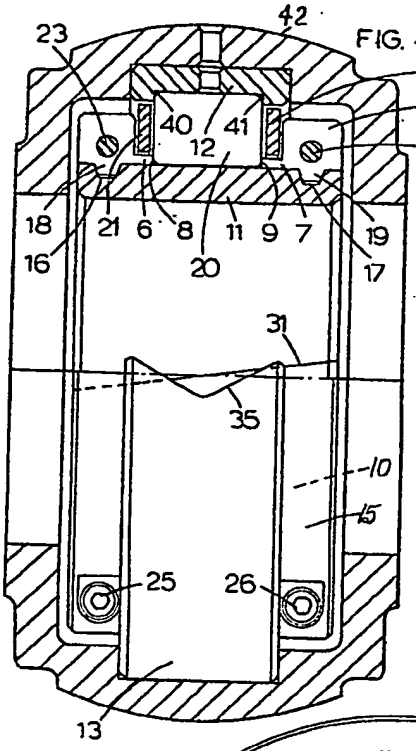

FIG. 1.

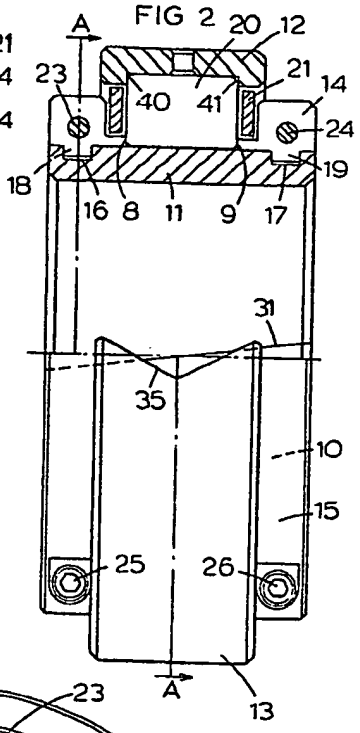

FIG 2

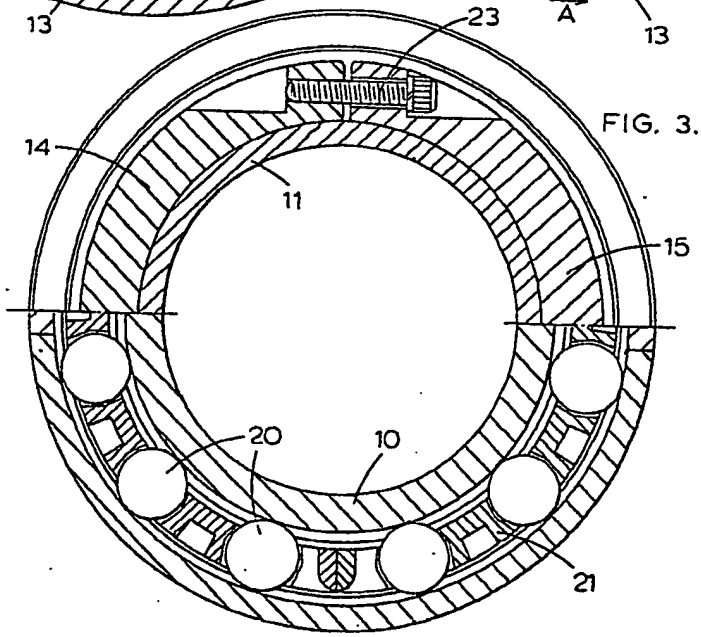

FIG. 3.

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Sheets 1 & 2

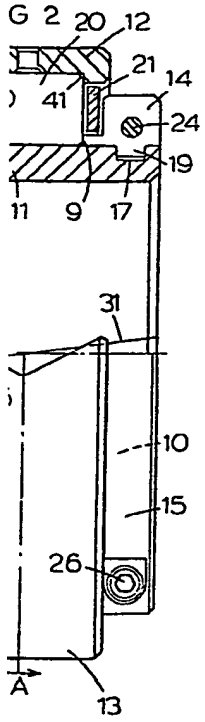
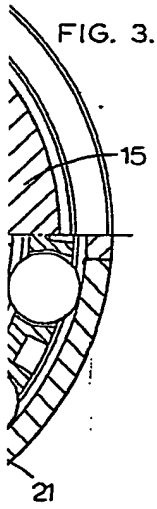


FIG. 3.



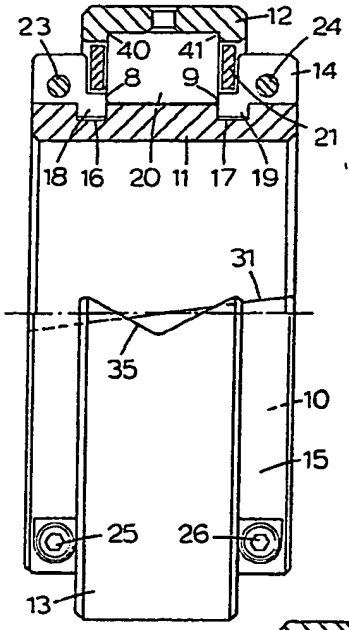


FIG 4

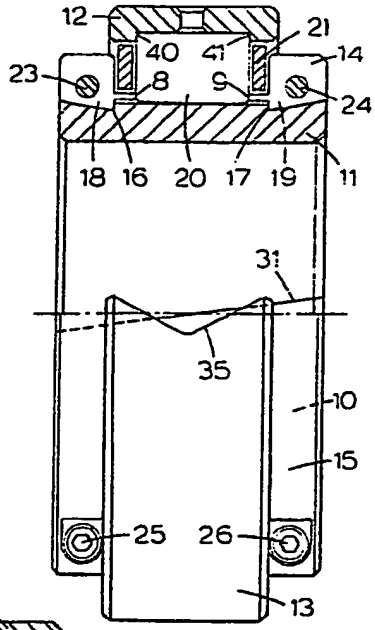


FIG 5

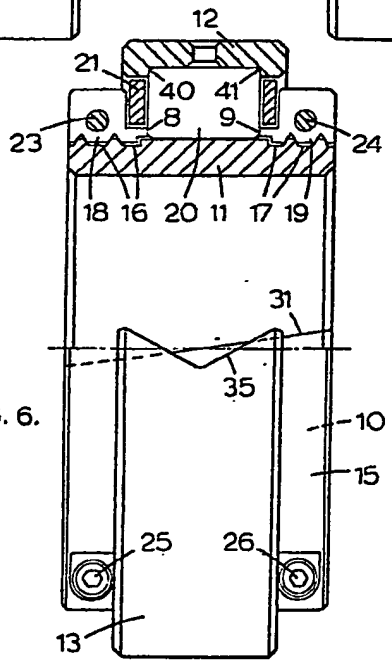


FIG. 6.

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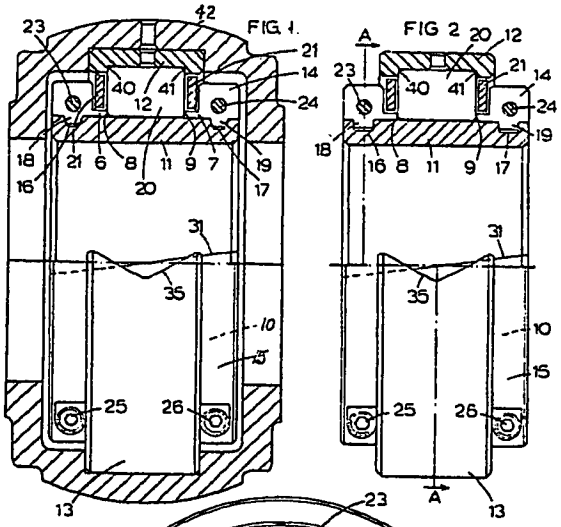
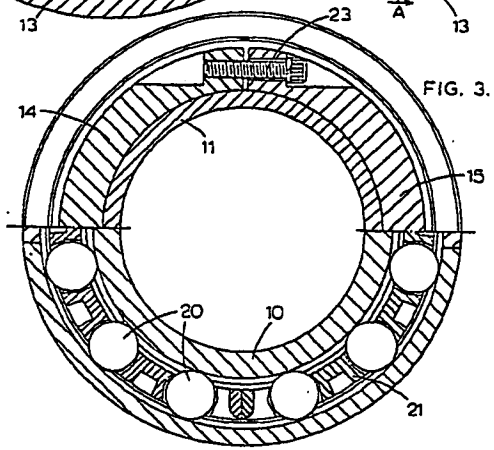




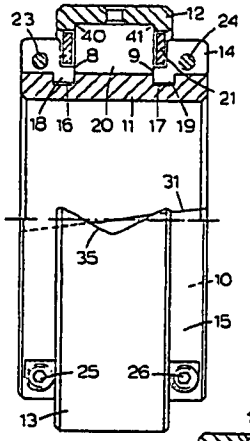


FIG 4

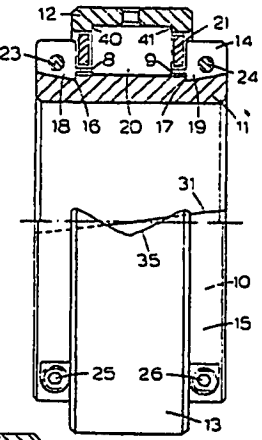


FIG 5

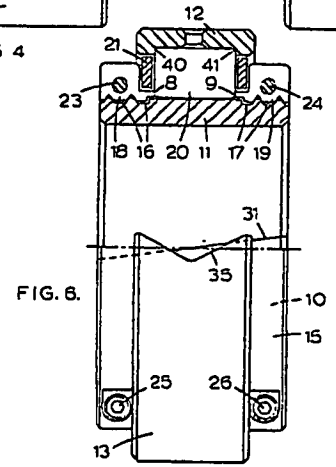


FIG. 6.

FIG. 7.

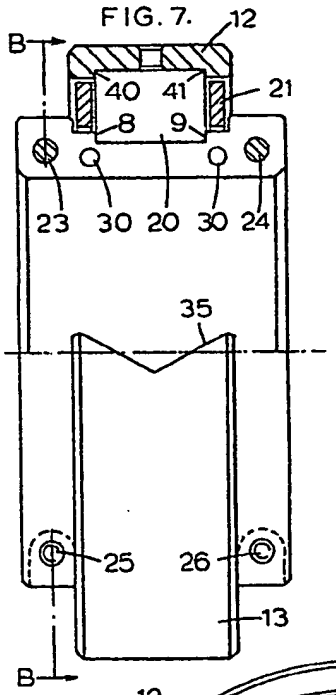


FIG. 8.

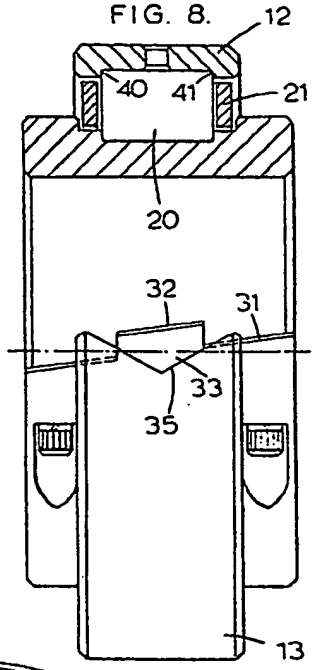
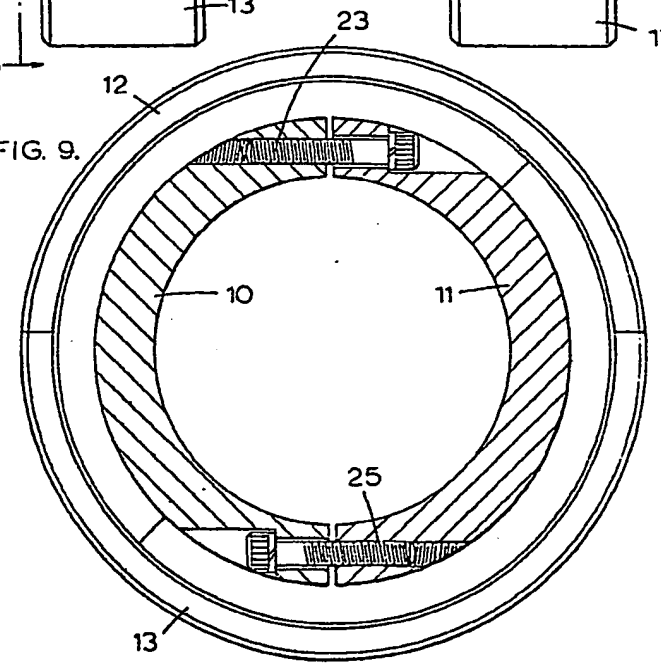


FIG. 9.



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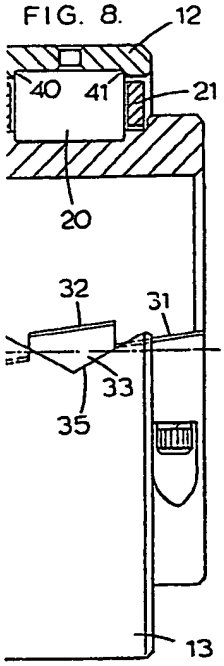
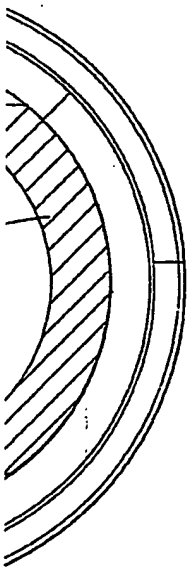
Sheets 3 & 4

FIG. 8.





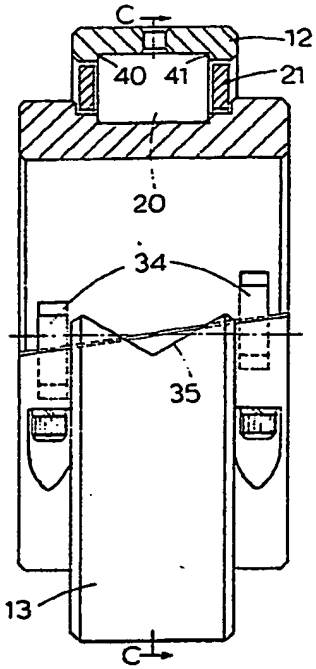


FIG. 10.

FIG. 11.

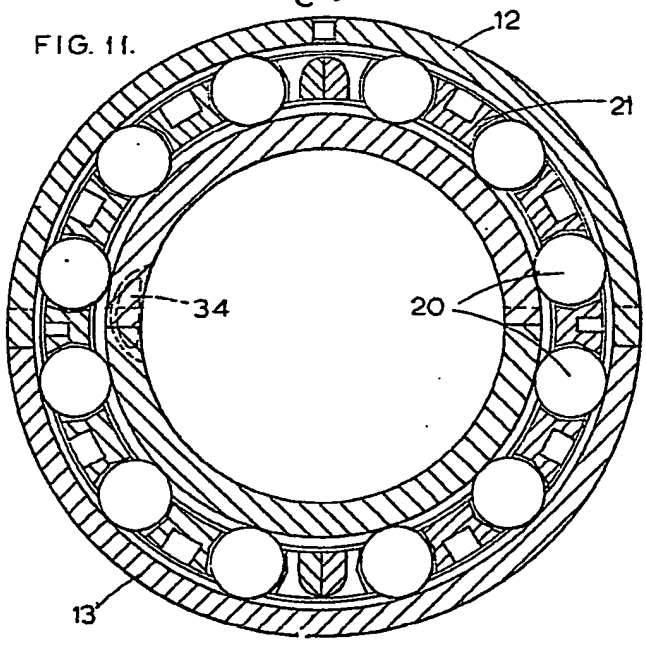


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FIG. 7.

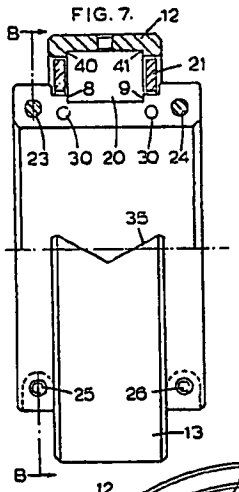
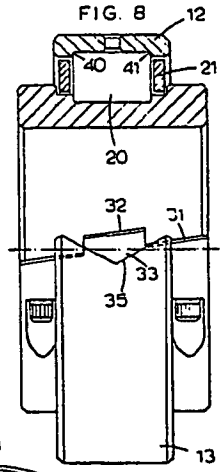


FIG. 8



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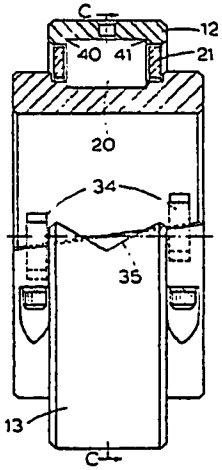

FIG. 9.

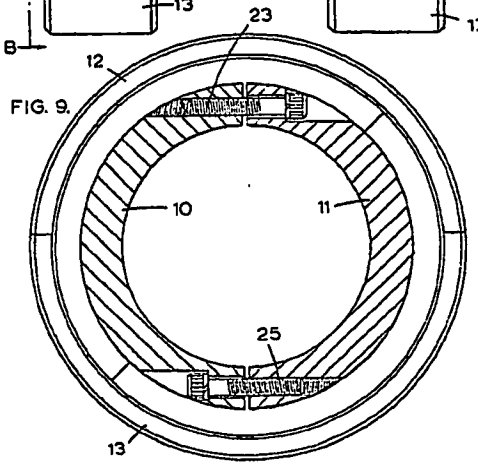

FIG. 11.